Amendments to the Claims:

This listing of claims will replace all prior version, and listings, of claims in the application:

Listing of Claims:

1-10 (Canceled).

11. (New) A device for igniting an air-fuel mixture in an internal combustion engine using a high-frequency electrical power source, comprising:

a coaxial waveguide structure into which the high-frequency electrical power source is coupled, the coaxial waveguide structure having an inner conductor and outer conductor;

wherein the inner conductor projects from one end of the coaxial waveguide structure by a predefined amount and protrudes into an individual combustion chamber of a cylinder of the internal combustion engine, a microwave plasma being generated at the one end of the coaxial waveguide structure by a high voltage potential, and wherein the one end of the coaxial waveguide structure is configured as an igniter such that when a voltage potential is applied, a free-standing plasma is generated in the air-fuel mixture around the inner conductor of the coaxial waveguide structure that projects from the one end of the coaxial waveguide structure, by field lines protruding into the combustion chamber.

12. (New) The device of claim 11, wherein the coaxial waveguide structure is configured such that, for a predefined effective wavelength of a high-frequency oscillation that is coupled in, a cavity resonator results approximately according to the formula (2n+1) * (predefined effective wavelength)/4, wherein $n \geq 0$, and wherein the high-frequency oscillation is coupled in by one of a capacitive coupling, inductive coupling, mixed coupling, and aperture coupling.

13. (New) The device of claim 12, wherein the one end of the coaxial waveguide structure having the inner conductor protruding into the combustion chamber includes a seal made of dielectric material between the outer conductor and the inner conductor, the seal having at least one of an abrupt change and a smooth change in radial diameter along the axial direction, whereby an optimal configuration of the field lines is provided for generating the free-standing plasma.

14. (New) The device of claim 11, wherein the one end of the coaxial waveguide structure having the inner conductor protruding into the combustion chamber includes a seal made of dielectric material between the outer conductor and the inner conductor, the seal having at least one of an abrupt change and a smooth change in radial diameter along the axial direction, whereby an optimal configuration of the field lines is provided for generating the free-standing plasma.

15. (New) The device of claim 14, wherein the seal is mounted in a recess of the outer conductor, the recess having at least an abrupt enlargement in radial diameter.

16. (New) The device of claim 14, wherein in an area of the one end of the waveguide structure having the inner conductor protruding into the combustion chamber, a cross section of the inner contour of the outer conductor and a cross section of the outer contour of the inner conductor are correspondingly changed at least one of abruptly and smoothly.

17. (New) The device of claim 11, wherein an electrical signal that is a function of physical variables of the free-standing plasma in the air-fuel mixture is decoupled at one of the high-frequency electrical power source and the coaxial waveguide.

18. (New) The device of claim 17, further comprising:

an analyzing circuit for further processing the decoupled electrical signal, whereby at least one of a device diagnosis, a regulation of the high-frequency electrical power source, and a control of predefined operating functions is effected.

19. (New) The device of claim 11, wherein the high-frequency electrical power source includes a free-running oscillator circuit, and wherein a combination of the free-running oscillator circuit, the coaxial waveguide and a further component in a common housing forms a compact ignition unit.

20. (New) The device of claim 19, further comprising an amplifying circuit connected to the free-running oscillator circuit downstream of the free-running oscillator circuit.

21. (New) The device of claim 20, wherein at least one of the free-running oscillator circuit and the amplifying circuit is an integrated semiconductor circuit including one of SiC and GaN components.